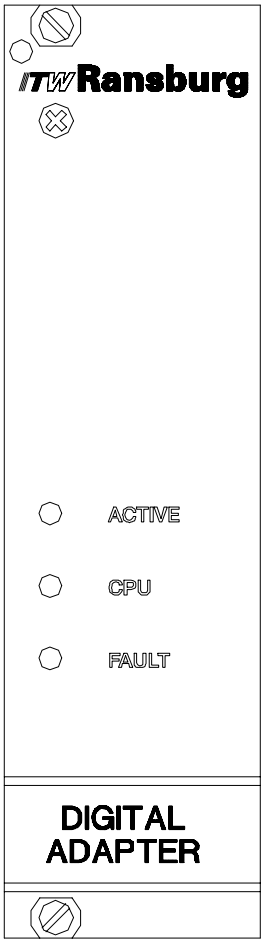
ITW Ransburg
Electrostatic Systems

SERVICE MANUAL
LN-9214-00.2

DIGITAL NODE ADAPTER



MODEL: 75584

IMPORTANT: Before using this equipment, carefully read SAFETY PRECAUTIONS, starting on page 1, and all instructions in this manual. Keep this Service Manual for future reference.

NOTE: This manual has been changed from revision **LN-9214-00.1** to revision **LN-9214-00.2**. Reasons for this change are noted under “Manual Change Summary” inside the back cover of this manual.

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SAFETY

SAFETY PRECAUTIONS

Before operating, maintaining or servicing any ITW Ransburg electrostatic coating system, read and understand all of the technical and safety literature for your ITW Ransburg products. This manual contains information that is important for you to know and understand. This information relates to USER SAFETY and PREVENTING EQUIPMENT PROBLEMS. To help you recognize this information, we use the following symbols. Please pay particular attention to these sections.

A WARNING! states information to alert you to a situation that might cause serious injury if instructions are not followed.

A CAUTION! states information that tells how to prevent damage to equipment or how to avoid a situation that might cause minor injury.

A NOTE is information relevant to the procedure in progress.

While this manual lists standard specifications and service procedures, some minor deviations may be found between this literature and your equipment. Differences in local codes and plant requirements, material delivery requirements, etc., make such variations inevitable. Compare this manual with your system installation drawings and appropriate ITW Ransburg equipment manuals to reconcile such differences.

Careful study and continued use of this manual will provide a better understanding of the equipment and process, resulting in more efficient operation, longer trouble-free service and faster, easier troubleshooting. If you do not have the manuals and safety literature for your Ransburg system, contact your local ITW Ransburg representative or ITW Ransburg.

⚠ WARNING

➤ The user **MUST** read and be familiar with the Safety Section in this manual and the ITW Ransburg safety literature therein identified.

➤ This manual **MUST** be read and thoroughly understood by **ALL** personnel who operate, clean or maintain this equipment! Special care should be taken to ensure that the **WARNINGS** and safety requirements for operating and servicing the equipment are followed. The user should be aware of and adhere to **ALL** local building and fire codes and ordinances as well as **NFPA 33 SAFETY STANDARD, 2000 EDITION,** prior to installing, operating, and/or servicing this equipment.

⚠ WARNING

➤ The hazards shown on the following page may occur during the normal use of this equipment. Please read the hazard chart beginning on page 2.

AREA Tells where hazards may occur.	**HAZARD** Tells what the hazard is.	**SAFEGUARDS** Tells how to avoid the hazard.
Spray Area 	Fire Hazard Improper or inadequate operation and maintenance procedures will cause a fire hazard. Protection against inadvertent arcing that is capable of causing fire or explosion is lost if any safety interlocks are disabled during operation. Frequent power supply shutdown indicates a problem in the system requiring correction.	Fire extinguishing equipment must be present in the spray area and tested periodically. Spray areas must be kept clean to prevent the accumulation of combustible residues. Smoking must never be allowed in the spray area. The high voltage supplied to the atomizer must be turned off prior to cleaning, flushing or maintenance. When using solvents for cleaning: Those used for equipment flushing should have flash points equal to or higher than those of the coating material. Those used for general cleaning must have flash points above 100°F (37.8°C). Spray booth ventilation must be kept at the rates required by NFPA 33, 2000 Edition, OSHA and local codes. In addition, ventilation must be maintained during cleaning operations using flammable or combustible solvents. Electrostatic arcing must be prevented. Test only in areas free of combustible material. Testing may require high voltage to be on, but only as instructed. Non-factory replacement parts or unauthorized equipment modifications may cause fire or injury. If used, the key switch by-pass is intended for use only during set-up operations. Production should never be done with safety interlocks disabled. Never use equipment intended for use in waterborne installations to spray solvent based materials.
General Use and Maintenance	Improper operation or maintenance may create a hazard. Personnel must be properly trained in the use of this equipment.	Personnel must be given training in accordance with the requirements of NFPA-33, Chapter 16, 2000 edition. Instructions and safety precautions must be read and understood prior to using this equipment. Comply with appropriate local, state, and national codes governing ventilation, fire protection, operation maintenance, and housekeeping. OSHA references are Sections 1910.94 and 1910.107. Also refer to NFPA-33, 2000 edition and your insurance company requirements.

AREA Tells where hazards may occur.	**HAZARD** Tells what the hazard is.	**SAFEGUARDS** Tells how to avoid the hazard.
Electrical Equipment 	High voltage equipment is utilized. Arcing in areas of flammable or combustible materials may occur. Personnel are exposed to high voltage during operation and maintenance. Protection against inadvertent arcing that may cause a fire or explosion is lost if safety circuits are disabled during operation. Frequent power supply shut-down indicates a problem in the system which requires correction. An electrical arc can ignite coating materials and cause a fire or explosion.	The power supply, optional remote control cabinet, and all other electrical equipment must be located outside Class I or II, Division 1 and 2 hazardous areas. Refer to NFPA No. 33, 2000 Edition. Turn the power supply OFF before working on the equipment. Test only in areas free of flammable or combustible material. Testing may require high voltage to be on, but only as instructed. Production should never be done with the safety circuits disabled. Before turning the high voltage on, make sure no objects are within the sparking distance.
Spray Area / High Voltage Equipment 	This is a high voltage ungrounded device that can produce electrical arcs capable of igniting coating materials.	Parts being sprayed must be supported on conveyors or hangers and be grounded. The resistance between the part and ground must not exceed 1 megohm. (Reference NFPA Bulletin No. 33, 2000 Edition.) A safe distance must be maintained between the parts being coated and the atomizer bell. A distance of at least 1 inch for each 10 kV of power supply output voltage is required at all times. Parts must be supported so that they will not swing and reduce the clearance specified above. All electrically conductive objects in the spray area, with the exception of those objects required by the process to be at high voltage, must be grounded. Unless specifically approved for use in hazardous locations, the power supply and other electrical equipment must not be used in Class I, Division 1 or 2 locations.

INTRODUCTION

GENERAL DESCRIPTION

Each Node Adapter Module can be characterized by the same basic block diagram. This has three parts: (1) RIO interface, (2) central processor, and (3) input/output circuits.

The RIO interface contains some Allen-Bradley (A-B) components which are licensed to ITW. These are designed specifically to communicate with the proprietary protocol of the RIO serial link. The central component of this block is an application specific IC (ASIC) which is capable of formatting the RIO information for use by the central processor. The actual termination of the RIO cable is made to an Interface Board at the rear of the Node Adapter Module location. An 82 Ohm resistor is provided on the Interface Board to terminate the RIO cable. Where the RIO cable is daisy-chained to more than one Node Adapter, only the last connection point in the daisy-chain should be terminated by moving the associated switch to the “TERM” position.

The core of the central processor is an 8032 microprocessor which communicates with the A-B ASIC. The 8032 provides an RS-422 port from which diagnostic functions are accomplished via internal “debugger” software. The main software program, which includes the “debugger” functions, is contained in an Erasable Programmable Read-Only Memory (EPROM). The EPROM’s for each Node Adapter are of course unique for its application.

The RIO interface and central processor hardware blocks for each Node Adapter are very similar. The similarity ends at the input/output circuits, as they are unique for each module. In each, some data processing circuitry transfers information between the central processor and the necessary input/output devices. Depending on the Node Adapter Module, these devices may be A/D convertors, D/A convertors, data bus managers, multiplexer or demultiplexers.

SPECIFICATIONS

Environmental / Physical

Temp. Operating:	0° to 55°C
Storage:	-40°C to 85°C
Humidity:	95% Non-Condensing
Size:	100 x 160mm Eurocard module, 35mm wide

Connections

PLC I/O:	3 position pluggable terminal strip on DAIF at backplane connector
Module I/O:	96-pin DIN 41612 connector
Diagnostic:	10-pin flat cable connector on DAIF

Electrical

Power Required:	24 VDC at 80 mA
SIGNAL LEVELS	
PLC I/O:	- Compatible with Allen-Bradley RIO - RIO termination resistor is switchable option on DAIF
DIGITAL MODE (Communication with 75119-02 Digital Module)	
Output:	5 V signal level: 8-bit data bus, 12 discrete outputs (10 Strobe, 2 Lockout)
PLC I/O:	
(Max. Mode):	Up to 82 points in output address, 3/4 logical rack
(Min. Mode):	Up to 41 points in output address, 1/2 logical rack
Application:	
(Max. Mode):	DGNA communicates to up to five Digital Modules via 74847, mother board, and up to five additional Digital Modules in second 74847, mother board, via DACAB. One DAIF (Digital configuration) is required for each DGNA and one DACAB is used to connect between DAIF and second mother board. The slot 5 and slot 10 Digital Modules may be replaced by A10204-01, Discrete Modules, when 74787-00S, mother board, is used.
(Min. Mode):	DGNA communicates to up to five Digital Modules via 74847, mother board. One DAIF (Digital configuration) is required for each DGNA.
ATOMIZER MODE	
Output:	5 V signal level: 8-bit data bus, 30 discrete outputs (10 Strobe, 20 Function Select) 0-10 V signal level: 20 analog outputs
PLC I/O:	
(Max. Mode):	Up to 10 BTW (speed command), 30 BTR (status/speed feedback/ pressure feedback), 1/2 logical rack
(Min. Mode):	Up to 5 BTW (speed command), 15 BTR (status/speed feedback/ pressure feedback), 1/4 logical rack
Application:	
(Max. Mode):	DGNA communicates to up to five 74944, Atomizer Modules, via 74847, mother board, and up to five additional Atomizer Modules in a second 74847, mother board, via DACB. One DAIF (Atomizer configuration) is required for each DGNA and one DACB is used to connect between DAIF and second mother board.
(Min. Mode):	DGNA communicates to up to five 74944, Atomizer Modules, via 74847, mother board. One DAIF (Atomizer configuration) is required for each DGNA.
DIAGNOSTIC	
	RS-422 port, manual input/output capability, may be used as main communication port

INSTALLATION

CONNECTIONS AND CONFIGURATIONS

Input Power

Required input power is regulated 24 VDC which is supplied by the mother board of the rack which contains the Node Adapter. An on board dc-dc converter makes 5 VDC for the modules logic level circuits. In the 74847-00 Mother Board, connect the 24 VDC supply to TB1-4 (+) and TB1-3 (-).

Remote I/O

The connection of the Allen-Bradley Remote I/O (RIO) is made to the Digital/Analog Interface (DAIF) Board. This is plugged into the Node Adapter connector at the **rear** of the mother board. The RIO cable wires are connected to J1 on the DAIF as shown in Figure 1. The RIO cable may be "daisy-chained" from one node to another per Allen-Bradley installation specifications. Where a termination resistor is specified, usually the last termination point in a chain, the resistor R1 on the DAIF board may be connected by placing switch SW1 to the "TERM" position. This connects the 82 Ohm resistor across blue and clear, appropriate for 230 k baud rate. If the RIO is configured for another baud rate, place SW1 in the "OPEN" position, and connect the appropriate resistor directly across J1 "BLU" and "CLR".

RIO Wire	DAIF J1 Position
Blue	BLU
Bare	SHLD
Clear	CLR

Figure 1: Remote I/O Connections

DAIF Board Jumpers

The DAIF board is used with the Digital Node Adapter. It is configured for each application by positioning jumpers E1 and E2. Figure 2b shows the correct jumper position for Digital Node Adapter communication to the FloTronics Atomizer Fiber Optic Speed Control Module. Figure 2a shows the correct jumper position for Digital Node Adapter communication to the FloTronics Digital Air Control Module.

Connection to Slave Half-Rack

The Digital Node Adapter communicates to five FloTronics Digital or Atomizer Modules via its own mother board. It can communicate to an additional mother board with modules (slave half-rack) by connecting the Digital/Analog cable (DACAB) from J2 on the DAIF board to J1 on the slave half-rack mother board.

Node Adapter Addressing / Configuration

The Digital Node Adapter must be set for the appropriate RIO address. The rack address and starting quarter are set by switch SW2 as shown in Figure 3. The Operating Mode, Last State, Baud Rate and Rack Size are set by positions 1-5 on switch SW1 as shown in Figure 3.

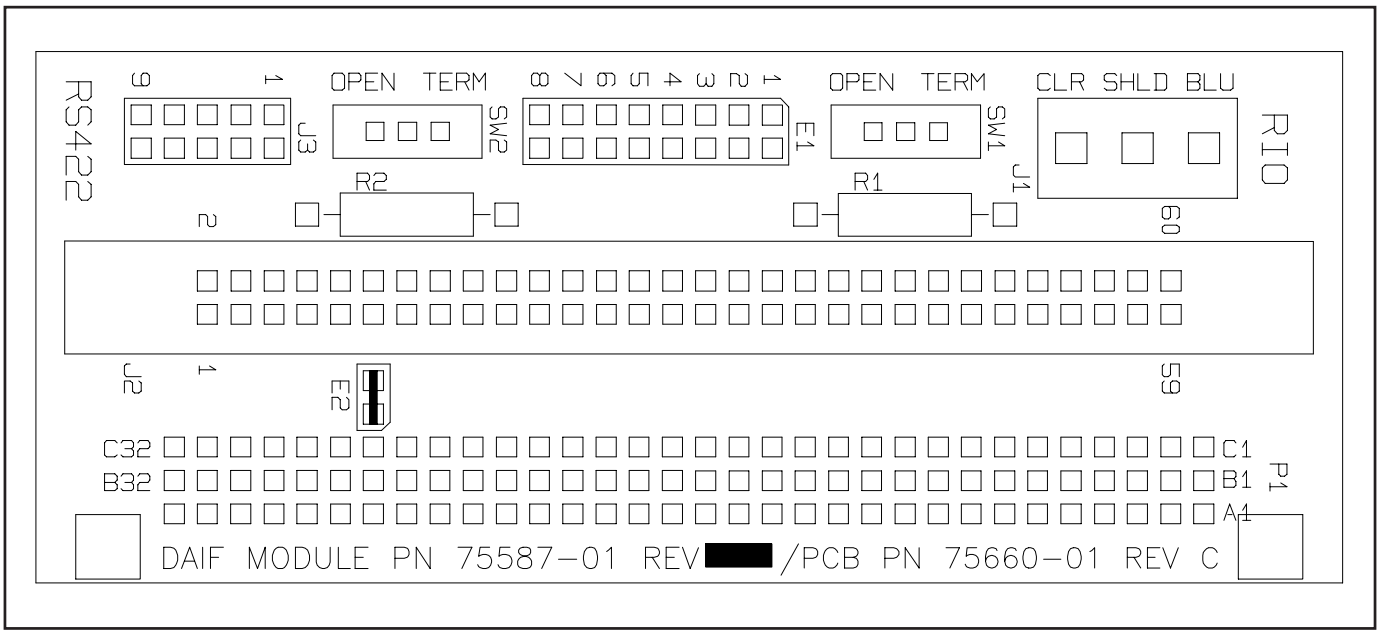


Figure 2a: E1, E2 Jumpers For Use With 75119-02, Digital Modules

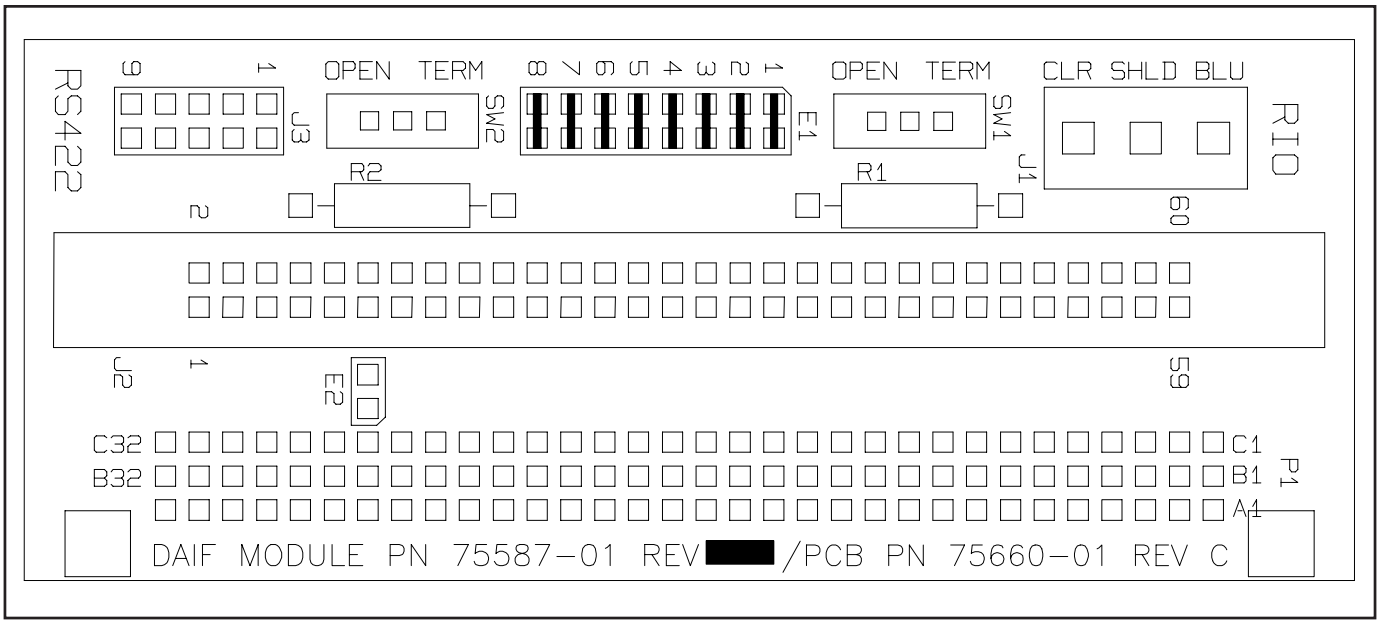
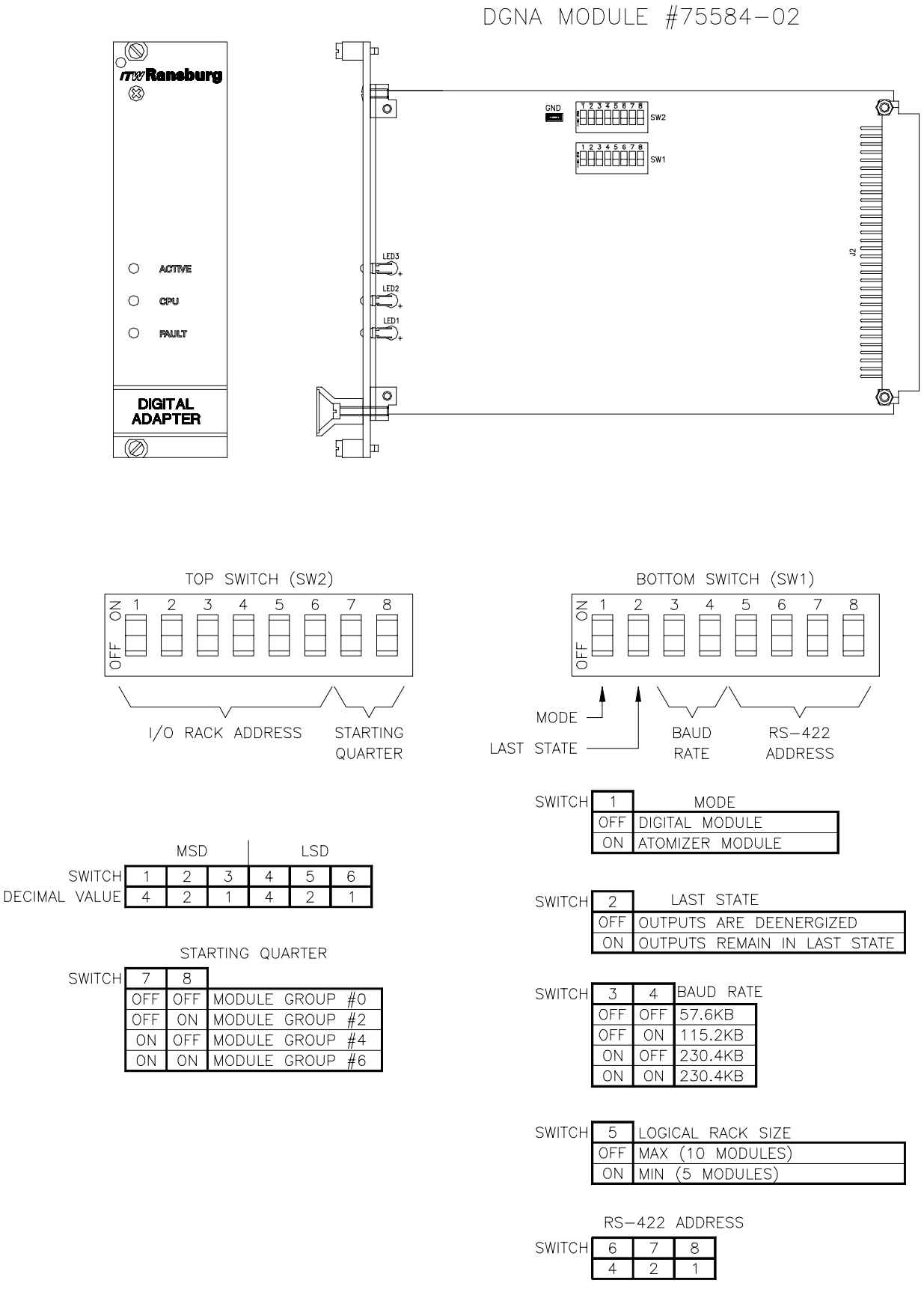


Figure 2b: E1, E2 Jumpers For Use With 74944-100, Atomizer Modules



	MSD			LSD		
SWITCH	1	2	3	4	5	6
DECIMAL VALUE	4	2	1	4	2	1

STARTING QUARTER

SWITCH	7	8	
	OFF	OFF	MODULE GROUP #0
	OFF	ON	MODULE GROUP #2
	ON	OFF	MODULE GROUP #4
	ON	ON	MODULE GROUP #6

SWITCH	1	MODE
	OFF	DIGITAL MODULE
	ON	ATOMIZER MODULE

SWITCH	2	LAST STATE
	OFF	OUTPUTS ARE DEENERGIZED
	ON	OUTPUTS REMAIN IN LAST STATE

SWITCH	3	4	BAUD RATE
	OFF	OFF	57.6KB
	OFF	ON	115.2KB
	ON	OFF	230.4KB
	ON	ON	230.4KB

SWITCH	5	LOGICAL RACK SIZE
	OFF	MAX (10 MODULES)
	ON	MIN (5 MODULES)

RS-422 ADDRESS

SWITCH	6	7	8
	4	2	1

Figure 3: Digital Node Adapter Module Switch Settings

OPERATION

MODES OF OPERATION

The Digital Node Adapter (DGNA) is designed to work in four different modes of operation. This section will describe these modes. The modules are located in a 74749 rack. The rack has 12 slots numbered 0 to 11 from left to right, viewed from the front.

Digital Max. Mode (Mode 1)

This mode allows the DGNA to communicate with up to 10 FloTronics Digital Air Control Modules (up to 80 digital air outputs). The DGNA is configured for 3/4 logical rack of PLC space. The DGNA is located in slot 0 (left-hand most slot) of a 74749-17 rack. Digital Modules are located in slots 1-5 and 7-11, with slot 6 empty. A Digital/Analog Interface (DAIF) board is located from the rear in slot 0 and a Digital/Analog Cable is connected from DAIF connector J2 to the J1 connector next to slot 6. The PLC I/O location map for this mode is shown in Figure 4.

Digital Min. Mode (Mode 2)

This mode allows the DGNA to communicate with up to 5 FloTronics Digital Air Control Modules (up to 40 digital air outputs). The DGNA is configured for ½ logical rack of PLC space. The DGNA is located in slot 0 if Digital Modules are located in slots 1-5 or slot 6 if Digital Modules are located in slots 7-11 of a 74749 rack. A DAIF board is used behind the DGNA for the RIO connection, but no DACAB is needed. The PLC I/O location map for the mode is shown in Figure 5.

Atomizer Max. Mode (Mode 3)

This mode allows the DGNA to communicate with up to 10 FloTronics Atomizer Speed Control Modules. The DGNA is configured for 1/2 logical rack of PLC space. The DGNA is located in slot 0 (left-hand most slot) of a 74749-17 rack. Atomizer Modules are located in slots 1-5 and 7-11, with slot 6 empty. A Digital/Analog Interface (DAIF) board is located from the rear in slot 0 and a Digital/Analog Cable is connected from DAIF connector J2 to the J1 connector next to slot 6. The PLC I/O location map for this mode is shown in Figures 6 and 7.

Atomizer Min. Mode (Mode 4)

This mode allows the DGNA to communicate with up to 5 FloTronics Atomizer Speed Control Modules. The DGNA is configured for 1/4 logical rack of PLC space. The DGNA is located in slot 0 if Atomizer Modules are located in slots 1-5 or slot 6 if Atomizer Modules are located in slots 7-11 of a 74749 rack. A DAIF board is used behind the DGNA for the RIO connection, but no DACAB is needed. The PLC I/O location map for the mode is shown in Figures 8 and 9.

DIGITAL MAX. MODE

Input Word		Discrete Input Bits
0	/00-/07 /10-/17	Not Used

DIGITAL MAX. MODE

Output Word		Discrete Output Bits	Module #
0	/00-/07	Not Used	
	/10	Digital Output Channel #1	Module #1
	/11	Digital Output Channel #2	
	/12	Digital Output Channel #3	
	/13	Digital Output Channel #4	
	/14	Digital Output Channel #5	
	/15	Digital Output Channel #6	
	/16	Digital Output Channel #7	
	/17	Digital Output Channel #8	
1	/00	Digital Output Channel #1	Module #2
	/01	Digital Output Channel #2	
	/02	Digital Output Channel #3	
	/03	Digital Output Channel #4	
	/04	Digital Output Channel #5	
	/05	Digital Output Channel #6	
	/06	Digital Output Channel #7	
	/07	Digital Output Channel #8	
	/10	Digital Output Channel #1	Module #3
	/11	Digital Output Channel #2	
	/12	Digital Output Channel #3	
	/13	Digital Output Channel #4	
	/14	Digital Output Channel #5	
	/15	Digital Output Channel #6	
	/16	Digital Output Channel #7	
	/17	Digital Output Channel #8	
2	/00	Digital Output Channel #1	Module #4
	/01	Digital Output Channel #2	
	/02	Digital Output Channel #3	
	/03	Digital Output Channel #4	
	/04	Digital Output Channel #5	
	/05	Digital Output Channel #6	
	/06	Digital Output Channel #7	
	/07	Digital Output Channel #8	
	/10	Digital Output Channel #1	Module #5
	/11	Digital Output Channel #2	
	/12	Digital Output Channel #3	
	/13	Digital Output Channel #4	
	/14	Digital Output Channel #5	
	/15	Digital Output Channel #6	
	/16	Digital Output Channel #7	
	/17	Digital Output Channel #8	

DIGITAL MAX. MODE (Continued)

Output Word		Discrete Output Bits	Module #
3	/00	Digital Output Channel #1	Module #6
	/01	Digital Output Channel #2	
	/02	Digital Output Channel #3	
	/03	Digital Output Channel #4	
	/04	Digital Output Channel #5	
	/05	Digital Output Channel #6	
	/06	Digital Output Channel #7	
	/07	Digital Output Channel #8	
	/10	Digital Output Channel #1	Module #7
	/11	Digital Output Channel #2	
	/12	Digital Output Channel #3	
	/13	Digital Output Channel #4	
	/14	Digital Output Channel #5	
	/15	Digital Output Channel #6	
	/16	Digital Output Channel #7	
	/17	Digital Output Channel #8	
4	/00	Digital Output Channel #1	Module #8
	/01	Digital Output Channel #2	
	/02	Digital Output Channel #3	
	/03	Digital Output Channel #4	
	/04	Digital Output Channel #5	
	/05	Digital Output Channel #6	
	/06	Digital Output Channel #7	
	/07	Digital Output Channel #8	
	/10	Digital Output Channel #1	Module #9
	/11	Digital Output Channel #2	
	/12	Digital Output Channel #3	
	/13	Digital Output Channel #4	
	/14	Digital Output Channel #5	
	/15	Digital Output Channel #6	
	/16	Digital Output Channel #7	
	/17	Digital Output Channel #8	
5	/00	Digital Output Channel #1	Module #10
	/01	Digital Output Channel #2	
	/02	Digital Output Channel #3	
	/03	Digital Output Channel #4	
	/04	Digital Output Channel #5	
	/05	Digital Output Channel #6	
	/06	Digital Output Channel #7	
	/07	Digital Output Channel #8	
	/10	Manual Mode Lockout	Master Rack
	/11	Manual Mode Lockout	Slave Rack
	/12-/17	Not Used	

Figure 4: Digital Max. Mode

DIGITAL MIN. MODE			
Output Word		**Discrete Output Bits**	**Module #**
0	/00-/07	Not Used	
	/10	Digital Output Channel #1	Module #1
	/11	Digital Output Channel #2	
	/12	Digital Output Channel #3	
	/13	Digital Output Channel #4	
	/14	Digital Output Channel #5	
	/15	Digital Output Channel #6	
	/16	Digital Output Channel #7	
	/17	Digital Output Channel #8	
1	/00	Digital Output Channel #1	Module #2
	/01	Digital Output Channel #2	
	/02	Digital Output Channel #3	
	/03	Digital Output Channel #4	
	/04	Digital Output Channel #5	
	/05	Digital Output Channel #6	
	/06	Digital Output Channel #7	
	/07	Digital Output Channel #8	
	/10	Digital Output Channel #1	Module #3
	/11	Digital Output Channel #2	
	/12	Digital Output Channel #3	
	/13	Digital Output Channel #4	
	/14	Digital Output Channel #5	
	/15	Digital Output Channel #6	
	/16	Digital Output Channel #7	
	/17	Digital Output Channel #8	
2	/00	Digital Output Channel #1	Module #4
	/01	Digital Output Channel #2	
	/02	Digital Output Channel #3	
	/03	Digital Output Channel #4	
	/04	Digital Output Channel #5	
	/05	Digital Output Channel #6	
	/06	Digital Output Channel #7	
	/07	Digital Output Channel #8	
	/10	Digital Output Channel #1	Module #5
	/11	Digital Output Channel #2	
	/12	Digital Output Channel #3	
	/13	Digital Output Channel #4	
	/14	Digital Output Channel #5	
	/15	Digital Output Channel #6	
	/16	Digital Output Channel #7	
	/17	Digital Output Channel #8	
3	/00-/07	Not Used	
	/10	Manual Lockout	ALL
	/11-/17	Not Used	

Figure 5: Digital Min. Mode

NOTES:

ATOMIZER MAX. MODE BTR		
BTR Word	**Module**	**Description**
0	Atomizer #1	Module status word*
1	Atomizer #1	Drive pressure, 0-255 equals 0-100 psi
2	Atomizer #1	Bell speed, 0-70 equals 0-70,000 rpm
3	Atomizer #2	Module status word*
4	Atomizer #2	Drive pressure, 0-255 equals 0-100 psi
5	Atomizer #2	Bell speed, 0-70 equals 0-70,000 rpm
6	Atomizer #3	Module status word*
7	Atomizer #3	Drive pressure, 0-255 equals 0-100 psi
8	Atomizer #3	Bell speed, 0-70 equals 0-70,000 rpm
9	Atomizer #4	Module status word*
10	Atomizer #4	Drive pressure, 0-255 equals 0-100 psi
11	Atomizer #4	Bell speed, 0-70 equals 0-70,000 rpm
12	Atomizer #5	Module status word*
13	Atomizer #5	Drive pressure, 0-255 equals 0-100 psi
14	Atomizer #5	Bell speed, 0-70 equals 0-70,000 rpm
15	Atomizer #6	Module status word*
16	Atomizer #6	Drive pressure, 0-255 equals 0-100 psi
17	Atomizer #6	Bell speed, 0-70 equals 0-70,000 rpm
18	Atomizer #7	Module status word*
19	Atomizer #7	Drive pressure, 0-255 equals 0-100 psi
20	Atomizer #7	Bell speed, 0-70 equals 0-70,000 rpm
21	Atomizer #8	Module status word*
22	Atomizer #8	Drive pressure, 0-255 equals 0-100 psi
23	Atomizer #8	Bell speed, 0-70 equals 0-70,000 rpm
24	Atomizer #9	Module status word*
25	Atomizer #9	Drive pressure, 0-255 equals 0-100 psi
26	Atomizer #9	Bell speed, 0-70 equals 0-70,000 rpm
27	Atomizer #10	Module status word*
28	Atomizer #10	Drive pressure, 0-255 equals 0-100 psi
29	Atomizer #10	Bell speed, 0-70 equals 0-70,000 rpm

*MODULE STATUS WORD	
Bit	**Information**
00-07	Bearing Air (8-bit analog)
08	Over Speed Fault
09	Under Speed Fault
10	Loss of Feedback Fault
11	Invalid Data Input
12	Low Bearing Air Fault
13	Bell Running
14-15	Not Used

Figure 6: Atomizer Max. Mode BTR

ATOMIZER MAX. MODE BTW		
BTW Word	**Module**	**Description**
0	Atomizer #1	Bell speed command 0-70 equals 0-70,000 rpm
1	Atomizer #2	Bell speed command 0-70 equals 0-70,000 rpm
2	Atomizer #3	Bell speed command 0-70 equals 0-70,000 rpm
3	Atomizer #4	Bell speed command 0-70 equals 0-70,000 rpm
4	Atomizer #5	Bell speed command 0-70 equals 0-70,000 rpm
5	Atomizer #6	Bell speed command 0-70 equals 0-70,000 rpm
6	Atomizer #7	Bell speed command 0-70 equals 0-70,000 rpm
7	Atomizer #8	Bell speed command 0-70 equals 0-70,000 rpm
8	Atomizer #9	Bell speed command 0-70 equals 0-70,000 rpm
9	Atomizer #10	Bell speed command 0-70 equals 0-70,000 rpm

Figure 7: Atomizer Max. Mode BTW

NOTES:

ATOMIZER MIN. MODE BTW		
BTW Word	**Module**	**Description**
0	Atomizer #1	Bell speed command 0-70 equals 0-70,000 rpm
1	Atomizer #2	Bell speed command 0-70 equals 0-70,000 rpm
2	Atomizer #3	Bell speed command 0-70 equals 0-70,000 rpm
3	Atomizer #4	Bell speed command 0-70 equals 0-70,000 rpm
4	Atomizer #5	Bell speed command 0-70 equals 0-70,000 rpm

Figure 8: Atomizer Min. Mode BTW

ATOMIZER MIN. MODE BTR		
BTR Word	**Module**	**Description**
0	Atomizer #1	Module status word*
1	Atomizer #1	Drive pressure, 0-255 equals 0-100 psi
2	Atomizer #1	Bell speed, 0-70 equals 0-70,000 rpm
3	Atomizer #2	Module status word*
4	Atomizer #2	Drive pressure, 0-255 equals 0-100 psi
5	Atomizer #2	Bell speed, 0-70 equals 0-70,000 rpm
6	Atomizer #3	Module status word*
7	Atomizer #3	Drive pressure, 0-255 equals 0-100 psi
8	Atomizer #3	Bell speed, 0-70 equals 0-70,000 rpm
9	Atomizer #4	Module status word*
10	Atomizer #4	Drive pressure, 0-255 equals 0-100 psi
11	Atomizer #4	Bell speed, 0-70 equals 0-70,000 rpm
12	Atomizer #5	Module status word*
13	Atomizer #5	Drive pressure, 0-255 equals 0-100 psi
14	Atomizer #5	Bell speed, 0-70 equals 0-70,000 rpm

*MODULE STATUS WORD	
Bit	**Information**
00-07	Bearing Air (8-bit analog)
08	Over Speed Fault
09	Under Speed Fault
10	Loss of Feedback Fault
11	Invalid Data Input
12	Low Bearing Air Fault
13	Bell Running
14-15	Not Used

Figure 9: Atomizer Min. Mode BTR

MAINTENANCE

TROUBLESHOOTING GUIDE

ADAPTER LED INDICATORS				
Active	**CPU**	**Fault**	**Fault Description**	**Possible Cause**
ON	ON	OFF	Normal operation	------
OFF	ON	OFF	Adapter not communicating	1. RIO cable not connected 2. Incorrect dipswitch settings on Node Adapter for Baud rate, Address or Starting Quarter
BLINK	ON	OFF	Adapter not controlling I/O	1. PLC in program mode 2. Another Node with same address on RIO
OFF	OFF	ON	Node Adapter processor not active	1. Hardware failure
OFF	OFF	OFF	No Node Adapter activity	1. No power to Node Adapter 2. Hardware failure

Figure 10: Troubleshooting Guide

PARTS IDENTIFICATION

Part #	Abbr.	Description
*75584-01, -02	DGNA	Digital Node Adapter
75587-01	DAIF	Digital/Analog Interface Board
75589-01	DACB	Digital/Analog Cable

*-01 and -02 are functionally identical. -02 is labeled with ITW Ransburg logo; -01 is labeled with ABB logo.

Figure 11: Part Numbers

NOTES:

WARRANTY POLICIES

LIMITED WARRANTY

ITW Ransburg will replace or repair without charge any part and/or equipment that falls within the specified time (see below) because of faulty workmanship or material, provided that the equipment has been used and maintained in accordance with ITW Ransburg's written safety and operating instructions, and has been used under normal operating conditions. Normal wear items are excluded.

THE USE OF OTHER THAN ITW RANSBURG APPROVED PARTS, VOID ALL WARRANTIES.

SPARE PARTS: One hundred and eighty (180) days from date of purchase, except for rebuilt parts (any part number ending in "R") for which the warranty period is ninety (90) days.

EQUIPMENT: When purchased as a complete unit, (i.e., guns, power supplies, control units, etc.), is one (1) year from date of purchase. **WRAPPING THE APPLICATOR IN PLASTIC, SHRINK-WRAP, ETC., WILL VOID THIS WARRANTY.**

FLUID HANDLING: One (1) year from date of purchase (i.e., Totalizer, CCV Valves, etc.).

AIR BEARING ROTATORS: Fifteen thousand (15,000) hours or three (3) years, whichever occurs first. Warranty period begins on the date of purchase.

ITW RANSBURG'S ONLY OBLIGATION UNDER THIS WARRANTY IS TO REPLACE PARTS THAT HAVE FAILED BECAUSE OF FAULTY WORKMANSHIP OR MATERIALS. THERE ARE NO IMPLIED WARRANTIES NOR WARRANTIES OF EITHER MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ITW RANSBURG ASSUMES NO LIABILITY FOR INJURY, DAMAGE TO PROPERTY OR FOR CONSEQUENTIAL DAMAGES FOR LOSS OF GOODWILL OR PRODUCTION OR INCOME, WHICH RESULT FROM USE OR MISUSE OF THE EQUIPMENT BY PURCHASER OR OTHERS.

EXCLUSIONS:

If, in ITW Ransburg's opinion the warranty item in question, or other items damaged by this part was improperly installed, operated or maintained, ITW Ransburg will assume no responsibility for repair or replacement of the item or items. The purchaser, therefore will assume all responsibility for any cost of repair or replacement and service related costs if applicable.

APPENDIX

PAINT AND SOLVENT SPECIFICATIONS

	REA™ / EFM™ EVOLVER	REM™ / M90™	NO. 2 HAND GUN	TURBODISK™	AEROBELL® II*** AEROBELL® AEROBELL® 33 RMA-101™
RECOMMENDED VISCOSITY USING A ZAHN NO. 2	18 TO 30 SEC	18 TO 30 SEC	20 TO 60 SEC	20 TO 60 SEC	20 TO 60 SEC
PAINT ELECTRICAL RESISTANCE**	.1 MΩ TO ∞	.1 MΩ TO ∞	.1 TO 1 MΩ	.1 MΩ TO ∞	.1 MΩ TO ∞
RECOMMENDED DELIVERY (UP TO)	1000 cc/min	1500 cc/min	180 cc/min	1000 cc/min	500 cc/min

GUIDE TO USABLE SOLVENT SELECTION

Chemical Name	Common Name	Category	Flash Point†† (TCC)	*CAS Number	Evap. Rate†	Elec. Res.**
DICHLOROMETHANE	Methylene Chloride	Chlorinated Solvents		75-09-2	**14.5**	HIGH
VM & P NAPHTHA	Naptha	Aliphatic Hydrocarbons	65ºF	8030-30-6	**10**	HIGH
ACETONE		Ketones	-18ºF	67-64-1	**5.6**	LOW
METHYL ACETATE		Esters	90ºF	79-20-9	**5.3**	LOW
BENZENE		Aromatic Hydrocarbons	12ºF	71-43-2	**5.1**	HIGH
ETHYL ACETATE		Esters	24ºF	141-78-6	**3.9**	MEDIUM
2-BUTANONE	MEK	Ketones	16ºF	78-93-3	**3.8**	MEDIUM
ISO-PROPYL ACETATE		Esters	35ºF	108-21-4	**3.4**	LOW
ISOPROPYL ALCOHOL	IPA	Alcohols	53ºF	67-63-0	**2.5**	LOW
2-PENTANONE	MPK	Ketones	104ºF	107-87-9	**2.5**	MEDIUM
METHANOL	Methyl Alcohol	Alcohols	50ºF	67-56-1	**2.1**	LOW
PROPYL ACETATE	n-Propyl Acetate	Esters	55ºF	109-60-4	**2.1**	LOW
TOLUOL	Toluene	Aromatic Hydrocarbons	48ºF	108-88-3	**1.9**	HIGH
METHYL ISOBUTYL KETONE	MIBK	Ketones	60ºF	108-10-1	**1.6**	MEDIUM
ISOBUTYL ACETATE		Esters	69ºF	110-19-0	**1.5**	LOW
ETHANOL	Ethyl Alcohol	Alcohols		64-17-5	**1.4**	LOW
BUTYL ACETATE		***Esters***	**78ºF**	***123-86-4***	***1.0***	***LOW***
ETHYLBENZENE		Aromatic Hydrocarbons	64ºF	100-41-4	**.89**	HIGH
1-PROPANOL	n-Propyl Alcohol	Alcohols	74ºF	71-23-8	**.86**	LOW
2-BUTANOL	sec.-Butyl Alcohol	Alcohols	72ºF	78-92-2	**.81**	LOW
XYLOL	Xylene	Aromatic Hydrocarbons	79ºF	1330-02-07	**.80**	HIGH
AMYL ACETATE		Esters	106ºF	628-63-7	**.67**	MEDIUM
2-METHYLPROPANOL	iso-Butyl Alcohol	Alcohols	82ºF	78-83-1	**.62**	LOW
METHYL AMYL ACETATE		Esters	96ºF	108-84-9	**.50**	LOW
5-METHYL-2-HEXANONE	MIAK	Ketones	96ºF	110-12-3	**.50**	MEDIUM
1-BUTANOL	n-Butyl Alcohol	Alcohols	95ºF	71-36-3	**.43**	LOW
2-ETHOXYETHANOL		Glycol Ethers	164ºF	110-80-5	**.38**	LOW
2-HEPTANONE	MAK	Ketones	102ºF	110-43-0	**.40**	MEDIUM
CYCLOHEXANONE		Ketones	111ºF	108-94-1	**.29**	MEDIUM
AROMATIC-100	SC#100	Aromatic Hydrocarbons	111ºF		**.20**	HIGH
DIISOBUTYL KETONE	DIBK	Ketones	120ºF	108-83-8	**.19**	MEDIUM
1-PENTANOL	Amyl Alcohol	Alcohols		71-41-0	**.15**	LOW
DIACETONE ALCOHOL		Ketones	133ºF	123-42-2	**.12**	LOW
2-BUTOXYETHANOL	Butyl Cellosolve	Glycol Ethers	154ºF	111-76-2	**.07**	LOW
CYCLOHEXANOL		Alcohols	111ºF	108-93-0	**.05**	LOW
AROMATIC-150	SC#150	Aromatic Hydrocarbons	149ºF		**.004**	HIGH
AROMATIC-200		Aromatic Hydrocarbons	203ºF		**.003**	HIGH

FASTER ⇑ SLOWER ⇓

***** CAS Number: Chemical Abstract Service Number.
****** Electrical Resistance using the ITW Ransburg Meter.
******* Solvent Base Configuration Only.
† Information Obtained From: http://solvdb.ncms.org
†† The lowest temperature at which a volatile fluid will ignite.
Evaporation Rate is Based Upon Butyl Acetate Having a Rate of 1.0
NOTE: Chart provides resistance and control information that we feel is necessary when using ITW Ransburg equipment.

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VISCOSITY CONVERSION CHART

Poise	Centipoise	DuPont Parlin 7	DuPont Parlin 10	Fisher 1	Fisher 2	Ford Cup 3	Ford Cup 4	Gardner - Holdt Bubble	Gardner - Lithographic	Krebs Unit KU	Saybolt Universal SSU	Zahn 1	Zahn 2	Zahn 3	Zahn 4	Zahn 5	Sears Craftsman Cup	Din Cup 4
.1	10	27	11	20			5	A-4			60	30	16					10
.15	15	30	12	25			8	A-3			80	34	17					11
.2	20	32	13	30	15	12	10				100	37	18					12
.25	25	37	14	35	17	15	12	A-2			130	41	19					13
.3	30	43	15	39	18	19	14	A-1			160	44	20					14
.4	40	50	16	50	21	25	18	A			210	52	22				19	15
.5	50	57	17		24	29	22			30	260	60	24				20	16
.6	60	64	18		29	33	25	B		33	320	68	27				21	18
.7	70		20		33	36	28			35	370		30				23	21
.8	80		22		39	41	31	C		37	430		34				24	23
.9	90		23		44	45	32			38	480		37	10			26	25
1.0	100		25		50	50	34	D		40	530		41	12	10		27	27
1.2	120		30		62	58	41	E		43	580		49	14	11		31	31
1.4	140		32			66	45	F		46	690		58	16	13		34	34
1.6	160		37				50	G		48	790		66	18	14		38	38
1.8	180		41				54		000	50	900		74	20	16		40	43
2.0	200		45				58	H		52	1000		82	23	17	10	44	46
2.2	220						62	I		54	1100			25	18	11		51
2.4	240						65	J		56	1200			27	20	12		55
2.6	260						68			58	1280			30	21	13		58
2.8	280						70	K		59	1380			32	22	14		63
3.0	300						74	L		60	1475			34	24	15		68
3.2	320							M			1530			36	25	16		72
3.4	340							N			1630			39	26	17		76
3.6	360							O		62	1730			41	28	18		82
3.8	380										1850			43	29	19		86
4.0	400							P		64	1950			46	30	20		90
4.2	420										2050			48	32	21		95
4.4	440							Q			2160			50	33	22		100
4.6	460							R		66	2270			52	34	23		104
4.8	480								00	67	2380			54	36	24		109
5.0	500							S		68	2480			57	37	25		112
5.5	550							T		69	2660			63	40	27		124
6.0	600							U		71	2900			68	44	30		135
7.0	700									74	3375				51	35		160
8.0	800								0	77	3380				58	40		172
9.0	900							V		81	4300				64	45		195
10.0	1000							W		85	4600					49		218
11.0	1100									88	5200					55		
12.0	1200									92	5620					59		

VISCOSITY CONVERSION CHART (Continued)

Poise	Centipoise	DuPont Parlin 7	DuPont Parlin 10	Fisher 1	Fisher 2	Ford Cup 3	Ford Cup 4	Gardner - Holdt Bubble	Gardner - Lithographic	Krebs Unit KU	Saybolt Universal SSU	Zahn 1	Zahn 2	Zahn 3	Zahn 4	Zahn 5	Sears Craftsman Cup	Din Cup 4
13.0	1300							X		95	6100					64		
14.0	1400								1	96	6480							
15.0	1500									98	7000							
16.0	1600									100	7500							
17.0	1700									101	8000							
18.0	1800							Y			8500							
19.0	1900										9000							
20.0	2000									103	9400							
21.0	2100										9850							
22.0	2200										10300							
23.0	2300							Z	2	105	10750							
24.0	2400									109	11200							
25.0	2500							Z-1		114	11600							
30.0	3000									121	14500							
35.0	3500							Z-2	3	129	16500							
40.0	4000									133	18500							
45.0	4500							Z-3		136	21000							
50.0	5000										23500							
55.0	5500										26000							
60.0	6000							Z-4	4		2800							
65.0	6500										30000							
70.0	7000										32500							
75.0	7500										35000							
80.0	8000										37000							
85.0	8500										39500							
90.0	9000										41000							
95.0	9500										43000							
100.0	10000							Z-5	5		46500							
110.0	11000										51000							
120.0	12000										55005							
130.0	13000										60000							
140.0	14000										65000							
150.0	15000							Z-6			67500							
160.0	16000										74000							
170.0	17000										83500							
180.0	18000										83500							
190.0	19000										88000							
200.0	20000										93000							
300.0	30000										140000							

Note: All viscosity comparisons are as accurate as possible with existing information. Comparisons are made with a material having a specific gravity of 1.0.

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VOLUMETRIC CONTENT OF HOSE OR TUBE (English Units)

I.D. (inches)	cc/ft.	Cross Section ($in.^2$)	Length				
			5ft. (60")	10ft. (120")	15ft. (180")	25ft. (300")	50ft. (600")
1/8	2.4	.012	.003 gal. .4 fl. oz.	.006 gal. .8 fl. oz.	.010 gal. 1.2 fl. oz.	.016 gal. 2.0 fl. oz.	.032 gal. 4.1 fl. oz.
3/16	5.4	.028	.007 gal. .9 fl. oz.	.014 gal. 1.8 fl. oz.	.022 gal. 2.8 fl. oz.	.036 gal. 4.6 fl. oz.	.072 gal. 9.2 fl. oz.
1/4	9.7	.049	.013 gal. 1.6 fl. oz.	.025 gal. 3.3 fl. oz.	.038 gal. 4.9 fl. oz.	.064 gal. 8.2 fl. oz.	.127 gal. 16.3 fl. oz.
5/16	15.1	.077	.020 gal. 2.5 fl. oz.	.040 gal. 5.1 fl. oz.	.060 gal. 7.6 fl. oz.	.100 gal. 12.7 fl. oz.	.199 gal. 25.5 fl. oz.
3/8	21.7	.110	.029 gal. 3.7 fl. oz.	.057 gal. 7.3 fl. oz.	.086 gal. 11.0 fl. oz.	.143 gal. 18.4 fl. oz.	.287 gal. 36.7 fl. oz.
1/2	38.6	.196	.051 gal. 6.5 fl. oz.	.102 gal. 13.1 fl. oz.	.153 gal. 19.6 fl. oz.	.255 gal. 32.6 fl. oz.	.510 gal. 65.3 fl. oz.

VOLUMETRIC CONTENT OF HOSE OR TUBE (Metric Units)

I.D. (mm)	cc/m	Cross Section (mm^2)	Length				
			1.5m	3.0m	4.5m	6.0m	7.5m
3.6	10.2	10.2	15.3 cc	30.5 cc	45.8 cc	61.1 cc	76.3 cc
5.6	24.6	24.6	36.9 cc	73.9 cc	110.8 cc	147.8 cc	184.7 cc
6.8	36.3	36.3	54.5 cc	109.0 cc	163.4 cc	217.9 cc	272.4 cc
8.8	60.8	60.8	91.2 cc	182.5 cc	273.7 cc	364.9 cc	456.2 cc

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MANUAL CHANGE SUMMARY

This manual was published to replace Service Manual **LN-9214-00.1**, *Digital Node Adapter*, to make the following changes:

1. New drawing on front cover.
2. Replace reference to NFPA 33 "1995" edition with "2000" edition.
3. Updated "Warranty Policies" section.
4. Added "Paint and Solvent Specifications" chart.
5. Added "Viscosity Conversion Chart".
6. Added "Volumetric Content of Hose or Tube" charts.
7. Updated location information on back cover.

Manufacturing
1910 North Wayne Street
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Technical/Service Assistance

Automotive Assembly and Tier I	Telephone: 800/ 626-3565	Fax: 419/ 470-2040
Industrial Systems	Telephone: 800/ 233-3366	Fax: 419/ 470-2071
Ransburg Guns	Telephone: 800/ 233-3366	Fax: 419/ 470-2071

Technical Support Representative will direct you to the appropriate telephone number for ordering Spare Parts.

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